

CLAIMS

We Claim:

1. In a network of nodes sharing a medium, a method of reserving
5 access to said medium, said method comprising the steps of:

a) during a first time interval, a first plurality of nodes in said
network each transmitting a request for medium allocation;

b) during said first time interval, a second plurality of nodes in said
network each receiving one of said requests from said step a);

10 c) during a second time interval, a first group of said second plurality
of nodes transmitting a request for their own medium allocation plus the
medium allocation specified in the received request from said step b); and

d) during said second time interval, a second group of said second
15 plurality of nodes each receiving one of said requests from said step c).

2. The method of Claim 1 wherein said step b) comprises the step of:

b) a node in said second plurality of nodes receiving said request from
a node to which it is paired on a basis of physical location.

20 3. The method of Claim 1 wherein said step b) comprises the step of:

b) a node in said second plurality of nodes receiving said request from
a node to which it is paired on a basis of transmission path characteristics.

4. The method of Claim 1 wherein said step b) comprises the step of:
b1) a node of said second plurality listening for said request from a node from said first plurality on a pre-determined frequency.

5 5. The method of Claim 1 wherein said step a) comprises the step of:
a1) a node of said first plurality transmitting said request on a pre-determined frequency.

10 6. The method of Claim 1 wherein said step a) comprises the step of:
a1) a node of said first plurality transmitting said request at a pre-determined power.

15 7. The method of Claim 1 further comprising the step of:
e) in further time intervals, pre-determined nodes transmitting requests and pre-determined nodes receiving requests until all nodes have transmitted their requests.

8. The method of Claim 7 further comprising the steps of:
f) a new node that is not part of said network determining the
20 received signal strength from said nodes in said network at the location of said new node;
g) said new node transmitting said determinations to a master node;
and

h) said master node using said data from said new node to determine which nodes of said network of nodes and said new node transmit during each of said time intervals.

- 5 9. The method of Claim 8 wherein said step f) comprises the steps of:
 - f1) said new node listening at a first frequency to determine the signal strength of a node in said network of nodes;
 - f2) repeating said step f1) for each of said time intervals; and
 - f3) repeating said step f2) for every other frequency being used,
- 10 wherein the signal strength at the location of said new node for each of said plurality of nodes in said network is determined.
10. The method of Claim 8 further comprising the step of:
 - i) said master node using said data from said new node to determine
 - 15 the power and frequency at which each of said plurality of nodes transmit when making a request for medium allocation.
11. The method of Claim 1 further comprising the steps of:
 - e) a node granting said requests; and
 - 20 f) said node transmitting an indicator of the resources to which each node of said network has been allocated.

12. The method of Claim 1 further comprising the steps of:

e) a node transmitting a scaling factor; and

f) a node in said network scaling its request for medium allocation by said scaling factor.

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13. In a network of nodes, a method of defining a reservation protocol comprising the steps of:

a) collecting information regarding the configuration of said nodes in said network;

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b) determining which of said nodes will transmit their request during each of a series of time intervals, wherein a plurality of said nodes are to transmit a request during at least one of said time intervals; and

c) determining which of said nodes is to receive each of said requests during each of said time intervals.

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14. The method of Claim 13 wherein said step a) comprises the step of:

a1) collecting information regarding the power with which each node in said network receives a transmission from each other node in said network.

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15. The method of Claim 13 wherein said step a) comprises the step of:

a1) collecting information regarding the power with which each node in said network receives a transmission from each other node in said network at a pre-determined frequency.

16. The method of Claim 13 wherein said step b) comprises the step of:
 b1) determining the power level at which each of said plurality of
 nodes will broadcast based on the configuration of said nodes in said
 5 network.

17. The method of Claim 13 wherein said step b) comprises the step of:
 b1) determining the frequency at which each of said plurality of nodes
 will broadcast based on the configuration of said nodes in said network.

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18. The method of Claim 13 wherein said step c) comprises the step of:
 c1) determining to which frequency each of said at least one node will
 receive based on the configuration of said nodes in said network.

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19. The method of Claim 13 wherein said step b) comprises the step of:
 b1) determining the number of said time intervals based on the
 number of nodes in said network.

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20. A method of reserving medium access for a network comprising a
 plurality of nodes, said method comprising the steps of:

- a) during a first time interval, pre-determined nodes each
 transmitting a request for resource allocation;
- b) during said first time interval, pre-determined nodes each
 receiving one of said requests transmitted from said step a);

c) during a second and later time intervals, pre-determined nodes of said nodes which received requests in the previous time interval transmitting a request for its own resource allocation plus the resource allocation specified in the received request from a previous time interval;

5 d) during said second and later time intervals, pre-determined nodes of said nodes which received requests in the previous time interval receiving requests from nodes transmitting in this time interval;

e) repeating said step c) and said step d) until there are two nodes yet to transmit; and

10 f) one of said two nodes from said step e) transmitting its requests to the other node, wherein the last receiving node knows the resource allocation requests of all nodes of said network.

21. The method of Claim 20 further comprising the steps of:

15 g) dividing a resource space comprising frequency and time division into packets;

h) assigning an order to each node in said network;

i) assigning an order to said resource packets; and

20 j) assigning the resource packets to the nodes in corresponding order.

22. The method of Claim 21 further comprising the step of:

k) a node listening to the requests of other nodes to determine which of said resource packets will be allocated to it.

23. The method of Claim 22 further comprising the steps of:

l) said master node transmitting a scaling factor; and

m) a node in said network scaling its request for resources by said

5 scaling factor.

24. The method of Claim 21 further comprising the steps of:

k) a master node granting said requests; and

l) said master node transmitting information describing the

10 resources packets to which each node has been allocated.

25. The method of Claim 20 wherein said step c) comprises the step of:

c1) increasing the coding gain with each successive time interval.

15 26. The method of Claim 20 wherein said step c) comprises the step of:

c1) said nodes transmitting with increasing power levels with each successive time interval.

27. The method of Claim 20 wherein said step d) comprises the step of:

20 d1) more than one of said nodes in said network receiving said requests for said resource allocation.

28. In a network of nodes sharing a medium, a method of reserving access to said medium, said method comprising the steps of:

a) during a first time interval, a first plurality of nodes in a first group of nodes in said network each transmitting a request for medium allocation on one of a plurality of unique frequencies;

b) during said first time interval, a first master node in said first group receiving said requests from said step a);

c) during said first time interval, a second plurality of nodes in a second group of nodes in said network each transmitting a request for medium allocation on one of said plurality of unique frequencies;

d) during said first time interval, a second master node in said second group receiving said requests from said step c); and

e) during a second time interval, repeating said step a) through said step d) with nodes which have yet to transmit their request transmitting their requests.

29. The method of Claim 28, further comprising the step of:

f) performing said step a) through said step d) with more than two groups.

30. The method of Claim 28, further comprising the step of:

f) during a third and successive time intervals, repeating said step a) through said step d) with new transmitting nodes until all nodes have transmitted their requests for medium access.

31. The method of Claim 30 further comprising the step of:

g) said first master node consolidating the requests from said first group and transmitting them to said second master node.

32. The method of Claim 31 further comprising the step of:

5 h) a node allocating medium resources on a per group basis.

33. The method of Claim 32 further comprising the step of:

f) said first master node allocating resources for said first group to requesting nodes in said first group of nodes.

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34. The method of Claim 33 wherein said allocating node is a base station.

35. In a network of nodes sharing a medium, a method of reserving

15 access to said medium, said method comprising the steps of:

a) a plurality of nodes each transmitting a request for medium allocation, wherein each node in said plurality is assigned a primary frequency and a secondary frequency from a plurality of frequencies and each node transmits on its assigned primary frequency;

20 b) each node of said plurality determining whether its request was received; and

c) each node for which its request was not received transmitting another request for medium allocation on its said assigned secondary frequency.

36. The method of Claim 35 further comprising the steps of:

d) each node that transmitted in said step c) determining whether its request was received; and

5 e) each node that determined in said step d) that its request was not received transmitting another request for medium allocation on a randomly determined frequency of said plurality of frequencies.

37. The method of Claim 35 wherein said step a) occurs during a first
10 time interval and said step c) occurs during a second time interval.

38. The method of Claim 35 wherein the number of nodes assigned the same primary frequency is less than the number of frequencies in said plurality of frequencies and said nodes which are assigned the same
15 primary frequency are not assigned the same secondary frequency as each other.

39. The method of Claim 35 wherein there are y frequencies, and wherein the primary frequency for the n th node is determined by the
20 equation:

$$n \text{ modulo } y.$$

40. The method of Claim 39 wherein the secondary frequency for the n th node is determined by the equation:

$$(((n/y) + n \text{ modulo } y)) \text{ modulo } y).$$

41. The method of Claim 35 wherein said step b) comprises the step of:

b1) a node in said plurality of nodes determining whether it has

5 received an acknowledgment for its request.

41. The method of Claim 35 wherein said step b) comprises the step of: